

Access to Healthy Food: A Key Focus for Research on Domestic Food Insecurity¹⁻³

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Abstract

Geographic access to food is an important dimension of food insecurity in the US, because it affects the cost of food that low-income consumers face and the decisions they make about which foods to purchase. This symposium highlighted several recent studies that developed new techniques for characterizing the food environment, analyzed its influence on consumption and weight status, and explored alternative policy options for interventions. *J. Nutr.* 140: 1167–1169, 2010.

For over 2 decades, the ASN has been involved in scientific work on the definition and measurement of domestic food insecurity and hunger. Research published by *The Journal of Nutrition* in 1990, and coordinated in part by the AIN, outlined the central concepts of domestic food insecurity that are still used today (1). In brief, the report defined food insecurity as an uncertain access to enough nutritious food for an active, healthy life. In 1995, with the assistance of researchers from ASN, the USDA, and other agencies, the federal government embarked on its first annual survey of household food insecurity in the US (2,3). At its annual meeting in 1998, the Society held its first full symposium on domestic food insecurity and hunger, reporting on the latest science behind this work (4–8).

Since then, ASN researchers and others have written extensively using this household measure, or variations of it, which are based on a set of questions on experiences and behaviors related to food deprivation. There are 2 broad directions this work has taken. One focused on improving the instrumentation, so that the problem of food insecurity could be documented in diverse populations, including older persons and Latinos, and in various international settings (9–14). A second line of research focused on the consequences of this problem, specifically examining the associations between food insecurity and various outcomes, such as weight status, cognitive development, and mental and other health outcomes (6,15–21).

A common conceptual framework of food security includes availability, access, and utilization as the 3 main dimensions that describe this condition (22). Typically, food availability describes the supply of food to a region or community, and food

access refers to the ability of an individual or household to acquire food, either through market purchase or own production. Utilization describes the process of converting food to nutrients, which can be affected by gastrointestinal and other infections, common in places where sanitation is compromised.

Given that there is a general abundance of food in the US with highly developed distribution networks and that malabsorption problems due to unsanitary conditions are relatively rare, much of the domestic literature on food insecurity has focused on the access dimension. From an economic standpoint, access to food is a function of purchasing power. Specifically, do households have sufficient incomes to afford an adequate diet given the prices of foods and other household necessities? The current method for assessing food insecurity at the national level (23), which uses the 18-question USDA scale, recognizes the importance of this by referencing all the experiences and behaviors asked about in these questions to a lack of household resources to buy food.

Purchasing power, of course, is not just a function of household income. The neighborhood food environment, broadly speaking, is also an underlying determinant of access in the sense that it affects the cost of purchasing an adequate diet. In neighborhoods without supermarkets, residents likely face higher prices for many healthy foods, because small stores typically charge more for items such as fresh produce. Often healthy food items, such as nonfat milk or whole-grain breads, are not found in these stores, so residents need to travel to outlying supermarkets to acquire them. This transportation cost increases the overall expense of acquiring a healthy diet. For those who do not own a car, or who are not on a convenient public transportation line, the cost in out-of-pocket expense, as well as in time, can be substantial.

Over the last decade, researchers have begun to study the neighborhood food environment and how it influences the access dimension of food insecurity and, in turn, the consumption behavior and health outcomes of low-income consumers. For example, Alwitt and Donley (24) used zip code areas as the unit of analysis and documented that there were fewer supermarkets in low-income areas. Morland et al. (25) found that African-Americans residing in census tracts with one or more supermarkets were more likely to meet their fruit and vegetable recommenda-

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tions than those that did not. Proximity of supermarkets was shown to be positively associated with diet quality among pregnant women in North Carolina (26). Rose and Richards (27) found that easy access to supermarkets was associated with an increased use of fruits among households participating in the Food Stamps Program.

Much of the work on neighborhood food environments has been done by those in the field of public health, or by those with specialties in geographic information system techniques. This is not surprising, because environmental concerns are at the core of the public health discipline and much of the analysis depends on integrating geo-referenced data. However, a better dissemination of this research to nutrition scientists, particularly those with interests in community nutrition and food security, might foster more interdisciplinary collaboration, and strengthen this nascent field of study. This was a principal objective of this symposium on access to healthy food.

A second objective of the symposium was to emphasize the importance of access to nutritious foods for understanding consumer choice and the socioeconomic dimensions of obesity, arguably the most pressing nutritional problem in the United States. Low-income individuals, who often have difficult access to fresh fruits and vegetables, consume less of these foods and are more likely to be overweight than others. Neighborhood environments may contribute to this problem by providing insufficient availability of low-energy nutritious foods and excess availability of energy-dense snack foods. Shelf space has a promotional effect and large quantities of certain types of foods in neighborhood stores may affect social norms about what is acceptable to eat.

A third objective was to highlight the latest work being done on neighborhood food access. The initial work described above has been advanced greatly by more comprehensive descriptions of the food environment, more sophisticated modeling of the relationship between access and consumption or health outcomes, as well as new work on the policy dimension of altering the food landscape.

The proceedings begin with a review of the link between food access and consumption or weight outcomes (28). This paper focuses on a multidimensional approach to measuring the food environment, one that combines a geo-mapping of food stores in an area with in-store observations on the availability of specific foods. In doing so, the research combines some of the insights from the food marketing literature, which has explored the impact of shelf space on purchases, with those of the recent public health studies on the geography of retail food outlets.

A relatively new line of research has studied questions related to food access among adolescents by linking data on the food environment to nationally representative surveys on consumption or weight status. Powell et al. (29) review economic and contextual factors, such as food prices and food outlet availability, that are associated with dietary behaviors and overweight prevalence among the U.S. adolescent population.

Various studies have shown associations between the BMI of individuals and their access to healthy food, typically using neighborhood supermarket availability as a proxy for access. But people living near each other may be similar in ways that are unobserved to the investigator and this could confound results. Chen and Florax (30) have previously accounted for this spatial autocorrelation in an econometric analysis of access to chain grocery stores and its potential impact on BMI. In their paper prepared for this symposium, they demonstrate how their results could be used to simulate the impact on BMI of the introduction of new grocers in underserved areas.

Supermarkets may not be economically viable in many low-income urban neighborhoods. However, these neighborhoods usually have a large number of small stores. The proceedings close with a paper by Bodor and colleagues (31), who explore the rationale for small store interventions as a means for improving access to healthy foods, using insights gained from research done in New Orleans.

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Literature Cited

- Anderson SA. Core indicators of nutritional state for difficult-to-sample populations. *J Nutr.* 1990;120:1555-600.
- Bickel GW, Andrews MS, Klein BW. Measuring food security in the United States: a supplement to the CPS. In: Hall D, Stavrianos M, editors. *Nutrition and food security in the Food Stamp Program.* Alexandria (VA): Food and Consumer Service, USDA; 1996.
- Hamilton WL, Cook JT, Thompson WW, Buron LF, Frongillo EA, Olson CM, Wehler CA. Household food security in the United States, 1995: summary report of the Food Security Measurement Project. Alexandria (VA): Food and Consumer Service, USDA; 1997.
- Frongillo EA Jr. Validation of measures of food insecurity and hunger. *J Nutr.* 1999;129:S506-9.
- Carlson SJ, Andrews MS, Bickel GW. Measuring food insecurity and hunger in the United States: development of a national benchmark measure and prevalence estimates. *J Nutr.* 1999;129:S510-6.
- Olson CM. Nutrition and health outcomes associated with food insecurity and hunger. *J Nutr.* 1999;129:S521-4.
- Hamelin AM, Habicht JP, Beaudry M. Food insecurity: consequences for the household and broader social implications. *J Nutr.* 1999;129:S525-8.
- Rose D. Economic determinants and dietary consequences of food insecurity in the United States. *J Nutr.* 1999;129:S517-20.
- Wolfe WS, Olson CM, Kendall A, Frongillo EA Jr. Hunger and food insecurity in the elderly: its nature and measurement. *J Aging Health.* 1998;10:327-50.
- Perez-Escamilla R, Segall-Correa AM, Kurdian Maranha L, Sampaio Md Mde F, Marin-Leon L, Panigassi G. An adapted version of the U.S. Department of Agriculture Food Insecurity module is a valid tool for assessing household food insecurity in Campinas, Brazil. *J Nutr.* 2004;134:1923-8.
- Coates J, Wilde PE, Webb P, Rogers BL, Houser RF. Comparison of a qualitative and a quantitative approach to developing a household food insecurity scale for Bangladesh. *J Nutr.* 2006;136:S1420-3.
- Melgar-Quinonez HR, Zubieta AC, McKnelly B, Nteziyemye A, Gerardo MF, Dunford C. Household food insecurity and food expenditure in Bolivia, Burkina Faso, And the Philippines. *J Nutr.* 2006;136:S1431-7.
- Harrison GG, Stormer A, Herman DR, Winham DM. Development of a spanish-language version of the U.S. household food security survey module. *J Nutr.* 2003;133:1192-7.
- Frongillo EA, Nanama S. Development and validation of an experience-based measure of household food insecurity within and across seasons in northern Burkina Faso. *J Nutr.* 2006;136:S1409-19.
- Adams EJ, Grummer-Strawn L, Chavez G. Food insecurity is associated with increased risk of obesity in California women. *J Nutr.* 2003;133:1070-4.
- Rose D, Bodor JN. Household food insecurity and overweight status in young school children: results from the Early Childhood Longitudinal Study. *Pediatrics.* 2006;117:464-73.
- Gundersen C, Lohman BJ, Garasky S, Stewart S, Eisenmann J. Food security, maternal stressors, and overweight among low-income US children: results from the National Health and Nutrition Examination Survey (1999-2002). *Pediatrics.* 2008;122:e529-40.
- Alaimo K, Olson CM, Frongillo EA Jr. Food insufficiency and American school-aged children's cognitive, academic, and psychosocial development. *Pediatrics.* 2001;108:44-53.

19. Alaimo K, Olson CM, Frongillo EA. Family food insufficiency, but not low family income, is positively associated with dysthymia and suicide symptoms in adolescents. *J Nutr.* 2002;132:719–25.
20. Cook JT, Frank DA, Berkowitz C, Black MM, Casey PH, Cutts DB, Meyers AF, Zaldivar N, Skalicky A, et al. Food insecurity is associated with adverse health outcomes among human infants and toddlers. *J Nutr.* 2004;134:1432–8.
21. Chilton M, Black MM, Berkowitz C, Casey PH, Cook J, Cutts D, Jacobs RR, Heeren T, de Cuba SE, et al. Food insecurity and risk of poor health among US-born children of immigrants. *Am J Public Health.* 2009;99:556–62.
22. Riely F, Mock N, Cogill B, Bailey L, Kenefick E. Food Security Indicators and Framework for Use in Monitoring and Evaluation of Food Aid Programs. Washington, DC: Food and Nutrition Technical Assistance, Academy for Educational Development; 1999.
23. Nord M, Andrews M, Carlson S. Household Food Security in the United States, 2007. Washington, DC: Economic Research Service, USDA; 2008.
24. Alwitt LF, Donley TD. Retail stores in poor urban neighbourhoods. *J Consum Aff.* 1997;31:139–64.
25. Morland K, Wing S, Diez Roux A. The contextual effect of the local food environment on residents' diets: the atherosclerosis risk in communities study. *Am J Public Health.* 2002;92:1761–7.
26. Laraia BA, Siega-Riz AM, Kaufman JS, Jones SJ. Proximity of supermarkets is positively associated with diet quality index for pregnancy. *Prev Med.* 2004;39:869–75.
27. Rose D, Richards R. Food store access and household fruit and vegetable use among participants in the US Food Stamp Program. *Public Health Nutr.* 2004;7:1081–8.
28. Rose D, Bodor JN, Hutchinson PL, Swalm C, Rice J. The importance of a multi-dimensional approach for studying the links between food access and consumption. *J Nutr.* 2010;140:1170–4.
29. Powell LM, Han E, Chaloupka FJ. Economic contextual factors, food consumption, and obesity among U.S. adolescents. *J Nutr.* 2010;140:1175–80.
30. Chen SE, Florax RJGM. Zoning for health: The obesity epidemic and opportunities for local policy intervention. *J Nutr.* 2010;140:1181–4.
31. Bodor JN, Ulmer VM, Futrell Dunaway L, Farley TA, Rose D. The rationale behind small store interventions in low-income urban neighborhoods: Insights from New Orleans. *J Nutr.* 2010;140:1185–8.